Method for C60 Fullerene Particle Manufacture Not Requiring Combustion or High Pressure

19 September 2022
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Introduction

Current methods of generating buckminsterfullerene are suitable only for manufacture in support of scientific applications and are not sufficiently economical to support widespread incorporation by industrial entities in the manufacture of structural materials or even lubricants. If a sufficiently improved method could be adopted for its manufacture, it is likely that these carbon buckyballs would become the ingredient of choice in a wide variety of products and would generally make the ideal backbone for high-strength construction materials in both terms of strength and cost.

Current methods of fullerene production call for the combustion of carbon followed by the purification of the soot, which consists mostly of non-buckyball carbon structures. This means using solvents in a multi-step process that yields fractions of a gram of C60 at a time at a non-trivial cost.

Abstract

Carbon fullerene spheres may be economically constructed using nothing more than a vat of water, two electrodes built into walls on opposing sides, and the ability to step up voltage at programmatic intervals.

The first step in my proposed method involves adding colloidal carbon atoms to the water with no electricity flowing through the water initially. The carbon would be allowed to evenly diffuse until individual carbon atoms naturally combine with others and form pentagonal and hexagonal shapes. The length of time this takes could be observed and used to determine the ideal length of time to allow the solution to stand.

Once the solution consists of only about 50% colloidal carbon, electricity is introduced to the water, flowing from one side to the other. Rather than using heat to bend lengths of carbon chains in a combustive process, this method utilizes the natural electromagnetic properties of graphene, a semi-metal, to assure that atoms attaching to the initial flat sections of 5 or 6 join at the desired angle.

When electricity tries to flow through a flat section of carbon in the transverse direction, it is entirely blocked. The energy has to go somewhere. In this case, it is translated into a magnetic output. The magnetic output is attractive to the electrons in any free-floating colloidal carbons.

When the orientation of the initial pentagonal and hexagonal sections is transverse with relation to the cathode, carbon atoms will tend to want to form links to the structure at specific offsets that are dictated by the voltage running through the foundational section as well as the percentage of the C60

structure that is completed. The more of a complete sphere is in place, the higher the voltage needs to be to coax remaining pieces into place. Provided that the correct sequence of voltages are used at the correct times, a substantial proportion of the carbon atoms will be transformed into fullerene.

Conversely, when foundational sections are parallel with the direction of current flow, they become ideal conductors and actually repel nearby colloidal carbon, prohibiting long, linear carbon chains.

Conclusion

Provided a sufficient concentration of colloidal carbon in the solution, continuous gentle agitation, and the right sequence of voltages, the semi-metal properties of carbon sheets can be leveraged to make fullerene production truly economical using nothing but electricity, individual carbon atoms, and water.